

Optimal Carbon Pricing Instruments for the United States

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## EXECUTIVE SUMMARY

This study examines optimal policy criteria that should be used in the design of a national carbon pricing policy. There have been many carbon-pricing policies implemented nationally and globally to varying degrees of success. By examining the impact of carbon pricing on the consumer, we will be able to design a policy that promotes economic independence and growth. This enables the consumer to invest more in individual carbon reducing technologies while also providing them greater economic freedom in the marketplace. Additionally, the impact of a national policy on emission producers will provide greater economic externalities enabling them to invest into the development new energy technology while also correcting the market distortion created by the social impact of CO<sub>2</sub> emissions.

This study found four key criteria that should be at the core of any national policy (a) revenue neutrality, (b) upstream implementation, (c) border-adjustable, and (d) incremental price rate. Although these key criteria are important for a national comprehensive policy, a change in the public discourse needs to occur. This study advocates for view the issue of carbon pricing from the perspective of economic stability rather than a climate reduction strategy. This paradigm shift will enable the creation of a more inclusive coalition, which will contribute to the overall implementation of a national policy.

### **Optimal Carbon Pricing Instruments for the United States**

One of the most pressing issues that the United States is facing today is to identify the optimal policy instrument with greatest chance of implementation to control and reduce carbon emissions nationwide. Upon concluding the United Nation Climate Change Conference (COP21) in 2015, over 200 hundred countries found consensus to limiting harmful carbon emissions to mitigate the worst effects of climate change to 1.5 degrees Celsius above pre-industrial levels. Currently, the global climate is projected to rise approximately 2 to 5.4 degrees Celsius by 2100 (Cleetus, 2011, p. 20), and while the COP21 countries agreed to limit carbon emission, it will be up to each country to design and implement policies which will meet these goals.

Two policy instruments can be leveraged when discussing carbon pricing, (a) an emissions trading scheme, and (b) carbon taxation. Both have been implemented in the past to varying degrees of success worldwide. Throughout the United States, there have been several regional carbon-pricing policies implemented at city and state levels to the same degree of varying success. The most effective way to decrease our national carbon emissions is through the implementation of a comprehensive national policy.

This study will define both policy instruments separately providing context and background for each. Then through a review of current literature, these instruments will be investigated, highlighting key design considerations that will affect both the American consumer and the general market. Through discussions held with subject matter policy experts in the environmental and energy realm, key design considerations will be presented. Finally, using the key design considerations presented in this study, a cohesive emission policy framework will be presented. This study will attempt to present the major aspects of this debate that should be taken

into account by future policymakers in the development of a comprehensive national emission reduction policy.

## **POLICY INSTRUMENTS**

### **Emissions Trading Scheme (ETS)**

Carbon-emission trading schemes, or cap-and-trade, is a regulatory tool that allows carbon-emission producers to barter for emission rights in order to meet a given emission cap or maximum emission limit. Emission rights can be given to producers based on prior emission rates and can be either allocated freely or auctioned. The goal of this regulatory tool is to reach the emissions cap, which would decrease proportionally to prior emissions, regardless of the price, which is then set based on supply and demand. Current emission trading markets such as the European Union Emission Trading Scheme (EU ETS) can be used as a template for future marketplace development (Chevallier, 2012, pp. 505-506).

An important aspect in setting an emission trade market is determining the scope and coverage it will have over the various sectors and institutions. This includes identifying which carbon-emission sources should be covered and what minimum emission thresholds, if any, should be set to exclude the minimal producers in order to maximize the abatement costs of the program that may vary in opportunity and geographic location. As an example the “EU ETS covers the most energy-intensive sectors, going from power production to coke, iron, or glass. This coverage concerns around 12,000 installations across the EU 27 countries, and represents about 50 percent of the carbon dioxide (CO<sub>2</sub>) emissions from the industry development” (Chevallier, 2012, pp. 505-506).

The scope and coverage effect how the market responds in setting the price for emission rights. Through a broad coverage such as that of the EU ETS, there is an “advantage of

enhancing the liquidity and efficiency of the market in terms of price discovery.” Additionally, caps can be set either at a relative level – which can apply to specific sectors based on emission output, or set at an absolute level – which all rights are distributed to market participants up to the maximum limit (Chevallier, 2012, pp. 505-506).

Additionally, there are different benefits associated with how the carbon-emission rights are allocated. They can be distributed freely, proportional to a pre-existing limit such as prior emissions; this is often known as grandfathering market participants. The main benefit of this allocation method is that it is generally politically acceptable as producers profit from the free distribution of rights. Another method is an emission rights auction, where the market participants pay for their needed rights. Through this method, revenue can be generated by the regulating agency vice the emission producers. This revenue can benefit the public by being recycled back into the economy reducing other fiscal burdens or incentivize energy efficiency research.

A final consideration with the carbon trading market is the participant’s ability to bank or retain emission rights that may not have been used. This design consideration allows the participants to manage its emission expenditure overall and respond better in times of volatility (Chevallier, 2012, pp. 505-506).

### **Carbon Taxation**

A carbon tax is a price-based policy tool that works by directly imposing a cost on carbon emissions associated with carbon-based fuels. The goal of this policy tool would be to set a common price that producers would pay per unit of carbon content, allowing for the quantity of emissions to fluctuate depending on whether the producers find it more cost efficient to reduce the emissions they generate or pay the tax. The tax would be applied economy-wide and to all

carbon-emitting sources, “affecting the price of each in proportion to its global warming potential, usually measured in terms of CO<sub>2</sub> emissions, or the CO<sub>2</sub> equivalent released when it is combusted” (Lachapell, 2012, pp. 209-2011).

Taxing carbon-emission sources is a straightforward policy tool, taxation should “be used to correct for instances in which market prices failed to reflect the full costs of an economic activity,” (Lachapell, 2012, pp. 209-2011). In this case, the inability to reflect the cost of the changing climate in regards to carbon emissions. One design consideration is the rate of tax, which should be proportional to the damage caused by each carbon-content unit. However, these estimates widely vary, as do current national and international implemented carbon-taxes.

Another consideration much like ETS is the scope and coverage of the tax. Ideally, an emission tax would be applied across all sectors; however, this may not be politically feasible, especially in countries like the United States, where industries like coal would be penalized more heavily than natural gas because of the higher carbon content (Lachapell, 2012, pp. 209-2011).

A final design consideration for carbon taxation is where to collect the tax and subsequently what to do with the revenue. The two places the tax could be collected are either upstream – at the point of production, or downstream – at the point of consumption. Taxing upstream provides several benefits including the ability to implement the tax through a limited number of producers reducing administrative cost, in addition to incentivizing producers to change their emission generating behavior. However, the tax burden placed on the producers would like transgress through the supply chain to be ultimately borne by the consumer (Lachapell, 2012, pp. 209-2011). The revenue produced by the tax can be used to offset various other fiscal burdens much like the ETS, or be made revenue-neutral – where any increase in cost

borne by the public is returned the public – by being recycled back to those likely to be hit hardest by the tax, the lower class, as a regressive earned income tax credit.

### **POLICY BACKGROUND**

American consumers will be most affected by a carbon pricing policy implemented on the national level. Through the consumption of carbon-produced products, the cost imposed on producers will eventually trickle down to the consumer and affect the cost of goods and services. Whether reflected directly in the cost of heating and electricity or indirectly through the cost of material items, consumers will see the implications of a policy prior to seeing the beneficial outcome on the environment (Shammin, Bullard, 2009). There are several factors to consider when examining how Americans will be affected by a carbon-pricing policy including their willingness to pay for the change, the effects of disproportionate cost imposition, and how to frame the carbon pricing argument to the general voter.

#### **Consumer Burden**

As cited by Kotchen et al, according to the EPA guidelines for economic analysis, the economic benefits of an environmental policy are measured in the public's willingness to pay (WTP) for the specific environmental outcome, in this case, the public's WTP for reducing carbon emissions. A stated-preference survey was conducted twice, once in 2010 and again in 2011 engaging 2034 adults in a valuation question directly asking how much the respondents would be willing to pay to reduce GHG. The survey showed that there was not much variation in the WTP ratio among the specific policy initiatives but that the respondent's willingness to pay "ranges between \$79 and \$89 per year for the next 10 years" (Kotchen et al., 2013, pp. 617).

The survey was designed to randomize the specific policy initiatives equally, which enable them to account for the public preference of a particular policy. The results illustrated a

nominal difference between the policy initiatives, indicating that regardless of the particular method used to price carbon, the public was willing to burden themselves financially in order to reduce overall carbon-emissions. The results break social normative values, including older adults and respondents that identified as either Republican or No Party having less desire to pay for a reduction in carbon-emissions, the researchers note that this likely due to the expected value returned to these survey participants (Kotchen et al., 2013).

Additionally, researchers found that approximately 18% of respondents each year the survey was conducted do not believe that global warming is occurring. The researchers found that “just over 20% of the survey respondent’s answered they do not know” regarding whether they would support a willingness to pay for climate change policy, further indicating the importance of climate-change communication with the public (Kotchen et al., 2013, pp. 620-623).

### **Regressive Nature of Carbon Pricing**

Although the public may be willing to burden themselves in order to achieve carbon reductions, any type of direct cost that is passed to the consumer will disproportionately affect low wage earning U.S. households (Shammin, Bullard, 2009). Of the two main policy initiatives, both have high potential to generate revenue for the federal government whether through the auctioning emissions, or tax. A common theme in discussing these initiatives is to try to ensure a revenue-neutral outcome for the consumer; meaning that regardless of what the consumer pays for the carbon emissions, they receive a benefit through a rebate, earned income tax credit or a reduction in other taxes. However, this raises concerns of equality of the shared revenue-neutral process.

As discussed by multiple scholars, (e.g. Shammin, Bullard 2009; Metcalf 2009; Repetto 2013) an inherent regressive nature exists in the distribution of carbon pricing on household income. Lower income households generally spend a large proportion of their income on energy consumption and other products with a high carbon emission rate, without having the disposable income to upgrade or invest in energy efficient products leaving these households more susceptible to fluctuations in carbon price. Although high-income households have the ability to offset the cost of energy related carbon pricing impacts, a large majority of the carbon consumption in these households are related to the use of gasoline and other goods or services. Although there are options to ensure a revenue-neutral solution that will offset the costs incurred by low-income households, “distributing the revenues equally among households on a per-household or per-capita basis would not fully compensate high income households for the incident costs.” Instead, “it would merely provide incentives for investing a few percent of their income in efficient equipment and shifting to less energy-intensive expenditure patterns” (Shammin, Bullard 2009, pp. 2435-2438).

### **Risk-Aversive Nature**

The uncertainty of climate change exists in the American consumer as noted through the research performed by Kotchen et al., (2013); however, this issue effects more than just the economy. “The national security community has identified climate change as one of this country’s important security issues, mainly because of the upheavals and crises it is likely to create around the world” (Repetto, 2013, pp.57). Climate change, like other national security issues has an inherent risk-averse nature. The policy responses to both these issues are designed to affect a future outcome that may not occur, or has a low probability of occurring but could adversely affect American’s and the U.S. economy (Repetto, 2013). Due to the similarities of the

potential outcomes, both national issues should be approached with the same risk-aversion method, as it will help protect the consumer from uncertain market fluctuations.

### **Political Feasibility**

As cited by Metcalf (2009), according to the *Stern Review's* Executive Summary, “Climate change presents a unique challenge for economics: it is the greatest and wide-ranging market failure ever seen. The economic analysis must therefore be global, deal with long time horizons, have the economics of risk and uncertainty at center stage, and examine the possibility of major, non-marginal change” (Metcalf, 2009, pp. 19). However, it has also been noted that there is a great amount of political liability associated with trying to implement these types of policies. Each policy has design considerations that complement each other, and given that difficulty in implementing these designs with minimal backlash from either the consumer or the producers, “the logical way forward is a hybrid of the two policies –an approach incorporated in some of the recent climate bills, though it was not properly explained or highlighted” (Cleetus, 2011, p. 19).

### **Currently Implemented Policy**

In both the United States and internationally, carbon taxation and emission trade schemes have been implemented and used since the early 1990s. This enables U.S. policy designers to use these working systems as a template to build from (Sumner et al., 2011). In the United States, a template for an emission trade market already exists and although it has not been implemented nationally, the establishment of the Regional Greenhouse Gas Initiative (RGGI), which is comprised of 10 Northeastern states, has already been successful in creating a working auctioning system and a permit exchange. In 2008, the RGGI began the world's first series of auctions for emission rights, it imposed a direct cost on market participants who bid for these

rights and offered participating governments a new source of revenue for re-allocation (Rabe, 2010, pp.586). This further spurred new proposals for carbon-emission reduction systems either as a tax or trade market.

In 2006, Boulder Colorado implemented a carbon tax on electricity use. The tax collected has since been used to fund an action plan promoting the use of energy efficiency, renewable energy and a reduction of vehicle usage. The tax that is imposed by the utility company estimates out to approximately \$12-13 per metric ton of CO<sub>2</sub> (Sumner et al., 2011, pp. 934). This can be considered an emission reduction success as the program funded by the carb tax has reduced the carbon emission equivalent of approximately 100 thousand metric tons carbon content.

There are currently several taxation measures in California that are awaiting implementation to join the list of approximately 10 international countries that have on going emission reduction taxes, and a larger group of countries who have implemented a emission trade market (Sumner et al., 2011). These policy instruments have proven to be effective regardless of the level of implementation.

## **METHOD**

### **Expert Testimony**

This study will utilize qualitative methods in order to establish key criteria for an optimal carbon pricing system. This will provide better context and contribute to the current body of knowledge of carbon pricing by expanding upon current and prior quantitative research, enabling public policy experts to discuss this issue from a policy design perspective. Providing this perspective is important to fully developing this issue as it reframes the public discourse away from an academic discussion on climate change science, and shifts the discussion into one that

focuses on the American economy and optimal policy design criteria with a higher chance of legislative implementation.

The group of experts was chosen from leading national think tanks who have previously written extensively on energy and environmental reform. The interviews conducted consisted of seven open-ended questions that were discussed during a 30-minute timeframe. The full interview protocol is listed in the appendix.

- Interviewees
  - Nicolas Loris – The Heritage Foundation
  - Robert Repetto – International Institute for Sustainable Development
  - Oren Cass – The Manhattan Institute
  - Catrina Rorke – R Street Institute
  - Eli Lehrer – R Street Institute
  - Bob Inglis – RepublicEN

## **FINDINGS**

There is consensus among policy experts that creating a national carbon-pricing scheme is important to the future of the United States, however not for the reason of protecting environment. Many see the importance of the policy resulting in a stronger future economy. This is because they believe implementing a carbon-pricing scheme relies less on correcting potentially dangerous climate impacts but rather it fixes a gross market deviation. The market failure they refer to involve the markets inability to adjust the cost of for the social externality that is produced by releasing carbon into the atmosphere. In this sense, creating a carbon pricing policy nationally, the focus should be on the economic impacts of such a policy rather than its overall success at reducing carbon emissions.

There are multitude of benefits and weaknesses to adopting a national policy; however according to all the experts interviewed, it all depends on the design on the policy that will determine effectiveness. Depending on the design, a carbon tax policy could be made revenue neutral, which would be a major benefit. Additionally, the newly generated revenue can close many tax loopholes, and other burdensome regulatory issues could be reduced or eliminated. Experts including Mr. Lehrer and Mr. Inglis believe by designing a tax like this, the greatest benefit would be creating the ability to cut detrimental taxes such as the payroll or capital gains tax, both of which would benefit the public and potentially spur economic growth. However, the greatest weakness identified resulted if the policy was not designed correctly. This design failure could lead to several detrimental outcomes of the policy including the misuse of the tax revenue, failure to prevent any type of emission reductions, or even creating an unbalanced and regressive tax system according to Ms. Rorke. As seen in some existing systems such as the EU ETS, loopholes have been created which can leave the policy impotent, and can prevent it from achieving the overarching goals.

The design of the carbon policy is one of the most important considerations that can be given in constructing a national policy. Of the two policy instruments, experts found that an ETS is likely to reduce emissions but offers too many disadvantages to prove not to be economically viable. However, both instruments if properly designed can be largely equivalent economically depending on whether if the tax rate or quantity of permits is set correctly. Of these two instruments, a tax would be the best as a core design as it is less easily manipulated through the political and regulatory process whereas an ETS can become burdensome with loopholes that provide greater advantages to carbon generating business as noted in the result of the Waxman-Markey bill in 2009 according to Mr. Lehrer.

There are many hurdles facing the successful implementation of a national carbon policy ranging from economical to political, however the biggest hurdle is to change the perspective in which this conversation is approached. According to Ms. Rorke, a major aspect to this challenge is the ability to identify what the problem truly is, whether we, as a society, value change today or in the future. It is easy for the public and many politicians to brush off issue as a problem for tomorrow, or even as an inevitably that may not exist. However, in framing the policy solution from an economic standpoint, we can change the perspective of the debate. The public issue no longer becomes whether it is a debate of God or science, but rather will we leave the future generations with the capability of being able to adapt and overcome a potentially hostile climate said Ms. Rorke. By creating a national policy, we can better promote a robust economy that will enable future generations to thrive regardless of what they have to face. However, if we stall the economy due to failed carbon policy measures, we leave future generation unable to adapt and thus more likely to fail as a society.

Although there are many design considerations that should be accounted for in crafting the ideal policy, many experts believe that there are few simple and common aspects that should be included in an ideal policy. The core of the policy should be designed as an incremental tax on upstream carbon emitters. This enables the industries to plan and predict the carbon price, which enable them to respond to changes within the market place. Another key component is that the tax should be revenue neutral; revenue that is collected from the tax should be used to cut other taxes, which have created deadweight loss in the economy. Through these actions, additional regulations on greenhouse gases can be reduced or eliminated, which will enable the industry to invest more into research and development, and additional future energy technologies. Finally, based on these design considerations, the tax rate should be boarder

adjustable. This is a key feature to ensure that, we are able to hold other carbon emitting countries accountable for the carbon they produce while also being able to benefit other countries who have comparable carbon reduction policies.

### **RECOMMENDATIONS**

Finding common ground is the most important thing when it comes the successful implementation of a national policy. Based on the criteria discussed by the experts, this study finds that more important than viewing this issue as a climate change reduction policy, it should be viewed as an economic stability issue facing the United States. By viewing it from this perspective, it would become easier to build a successful coalition of supporters from both political parties, as the common ground becomes economic sustainability rather than carbon emission reduction. This is important, as both sides of Congress have not been able to find common ground on the majority of legislative issues in recent years.

There are four key recommendations that should be considered in the design of any national carbon pricing policy. Overall, the policy should be structured as a tax; the infrastructure needed for implementation already exists nationally, and it also less complex and more politically viable than an ETS system. The first key criteria for this national policy should be revenue neutrality. This will help combat the natural regressiveness of a tax system while also helping to reduce other taxes currently in place, which will provide more freedom for consumer spending spurring economic growth and development. Second, the tax should be implemented upstream at the source of production rather than downstream at the point of consumption. This will enable better oversight and regulation of emitting firms while limiting the overall bureaucratic infrastructure. Third, the tax should be border-adjustable. This will enable the United States to be a global leader in carbon pricing while also providing an economic benefit to

countries that have implemented similar policies and penalizing countries that have no carbon pricing policies. Finally, the tax rate should be incremental and reviewed often. This will enable business to forecast and project changes in the tax enabling them to better price their products providing them with greater economic stability in the marketplace.

By following these recommendations, we can design a policy that will provide economic benefit to both consumers and the government while also encouraging new energy research through the promotion of a free-market system. There are many other carbon pricing policy criteria that can and should be considered in creating a comprehensive national policy, however these four criteria should be at the core of any policy discussion. Beyond specifically examining optimal policy criteria, the national perspective and public discourse need to be shifted to create a more inclusive coalition that will enable a greater chance for implementation.

### **CONCLUSION**

Overall, creating a national carbon policy is an import step forward, not only to protect our markets but also to ensure that we ensure that people are able to thrive in the face of adversity in the future regardless of the cause. In a time full of rhetoric and discourse, we lose much of our collective perspective. We have consistently had elected officials and political leaders that stand at opposite ends of the climate change debate. Whether or not some might believe that this phenomenon exists should be irrelevant. Instead, this issue should be viewed from a very different perspective; it should be viewed as a vital economic stability issue.

There has been much debate over the recent years regarding a cohesive carbon pricing policy. However, much of this rhetoric has been skewed by special interest groups and political organizations who never framed this issue in the correct way, or have purposely misled the public discussion to serve various agendas. Legislative actions such as the Lieberman-Warner

Climate Security Act of 2007 to the Raise Wages, Cut Carbon Act of 2009 have proposed their own kind of solution to the issue of climate change. However, each iteration of climate change legislation has been doomed to fail before it could even get started. This is because as a nation we have not focused on what this type of legislation is really trying to accomplish. We need to decide what path is most important for us to follow, implementing a carbon pricing policy now to correct the market distortion that has been created, or continue delaying policy initiative such as this that will cause greater harm in the future.

There have been many instances in which either a carbon tax or cap and trade system has been implemented, both with varying degrees of success. However, those implementations viewed the issue as a climate issue, and not as an economic issue. By properly designing a national carbon pricing policy, we can promote economic growth and development.

Additionally, through this design we can become world leaders in carbon policy enabling other countries to compete on the global market. Overall, this debate should not be about protecting the environment but rather should we place the greater value on our current economic path or should we look to strengthen our economy so that future generations are able to overcome any adversity that they might encounter.

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**APPENDIX**

**Interview Introduction Letter – Think Tank**

Dear [Insert Name]

I am a Master of Science candidate at DePaul University's School of Public Service studying Leadership and Policy Studies. I am currently in the process of writing my thesis and I am collecting data for that purpose. For my capstone project, I am very interested in identifying the optimal carbon-pricing policy instrument that can be implemented in the United States as a comprehensive national policy.

Based on your background within the energy and environmental field; I believe that you would be able to provide greater insight as a key subject matter expert to my research and findings. I am writing to ask if you would agree to being interviewed for this research project. The interview would be 30 minutes long consisting of approximately five questions relating to carbon pricing.

I thank you for your time and look forward to further communicating with you. If you any questions relating to this research project, please feel free to reach out to me.

Best Regards,  
Jeffrey K. Ryan  
DePaul University

**Thank You Letter for Participants**

Dear [Insert Name]

Thank you very much for taking the time to speak with me about carbon pricing policy. I really appreciate that you were able to take the time to discuss in depth your thoughts and beliefs in how the United States should approach this issue and what future aspects we should consider when it comes to a consolidated national policy. Your input is very valuable and has been a great aid in shaping my graduate thesis.

Thank you very much,  
Jeffrey Ryan

## **Interview Script**

### **Introductory Protocol**

To facilitate our note taking, we would like to audio tape our conversations today. Please sign the release form. For your information, only researchers on the project will be privy to the tapes. In addition, you must sign a form devised to meet our human subject requirements. Essentially, this document states that: (1) all personal information will be held confidential, (2) your participation is voluntary and you may stop at any time if you feel uncomfortable, and (3) we do not intend to inflict any harm. Thank you for your agreeing to participate.

We have planned this interview to last no longer than 30 minutes. During this time, we have several questions that we would like to cover. If time begins to run short, it may be necessary to interrupt you in order to push ahead and complete this line of questioning.

### **Introduction**

You have been selected to speak with me today because you have been identified as someone who has a great deal to share on carbon pricing and based on your background within the energy and environmental field; I believe that you would be able to provide greater insight as a key subject matter expert to my research and findings.

Q1: In your own words, what is carbon pricing and do you consider it important to the future of the United States.

Q2: Of the two policy instruments (Carbon Tax or Emission Trading), in your opinion, which is more likely to reduce carbon emissions and why.

Q3: What are some of the greatest benefits and biggest weaknesses of adopting a nation carbon-pricing policy and why.

Q4: What are some of the hurdles facing the implantation of a carbon-pricing scheme and how do we overcome them?

Q5: In your opinion, what would the ideal carbon-pricing policy look like?

Q6: Why would this policy offer the greatest chance at reducing emissions?

Q7: What are the chances that this policy would be successfully implemented?